

PREPRODUCTION INITIATIVE-NELP OIL SORBENT CLAY FLOOR RECLAMATION SYSTEM TEST PLAN

SITE: NS MAYPORT

1.0 OBJECTIVE

This test plan describes the data collection procedures for determining the environmental and financial returns of the Bio-Cleaner 150 oil sorbent clay floor reclamation system. The system will be tested in an operational environment at the Auto Hobby Shop at NS Mayport. Financial data will be reviewed to establish return on investment via indicators such as cost-benefit analysis, payback period, internal rate of return (IRR), and net present value (NPV).

The unit will also be evaluated on its ability to:

- reclaim used oil sorbent
- reduce the amount of new oil sorbent material purchased
- reduce the amount of hazardous waste requiring disposal.

2.0 DESCRIPTION

In its industrial, maintenance, and manufacturing facilities, the Navy currently uses various types of oil sorbent materials to soak up spilled oils, solvents, and other liquids. Of the various sorbent types used, clay floor dry is often the material of choice because it allows for easy spill and drip clean-up while minimizing the potential for slips and falls. In addition, because clay floor dry is heavier than other sorbent materials, it can be used outdoors because it does not blow away as easily. However, the proper disposal of used oil sorbent materials has become increasingly regulated and expensive ever since the U.S. EPA classified contaminated sorbents (*e.g.*, peat, paper, rags, pillows, socks, clay floor dry) as hazardous wastes. As such, it is illegal to dispose of these products by any methods other than the approved methods, which include incineration or landfilling. The approved methods are expensive, create liability, and require administrative record-keeping and regulated transportation. In addition, the products are typically destroyed or rendered useless after just one use.

The Bio-Cleaner 150 system is an oil sorbent clay floor reclamation system manufactured by Mi-Tech, Inc. This system removes the hydrocarbon contaminants from used clay sorbents—thereby allowing the material to be reused.

The system consists of two pieces of equipment. The first piece is a material cleaning system, which works as follows. The contaminated clay material is placed in a large processing drum. The drum is lowered into a laundering tank that contains a solution of water and extractant. The extractant is a surfactant that releases oil from the clay material

—thereby causing it to float to the top of the tank. This oil is then skimmed off by an automatic skimmer and disposed of as used waste oil. Thus, once the process is finished, all that remains is clean clay material, waste oil, and a tank of soapy water.

Microbes that break down and digest any residual oil left in the clay material or solution are available. This oil is broken down into water, carbon dioxide, and fatty acids. The fatty acids are similar to the fatty acids used to make soaps. However, the vendor has determined that the microbes will not be beneficial in this particular use of the equipment.

The Bio-Cleaner is a closed-loop system, which means that the same water solution can be refreshed and reused indefinitely. The system can process 150 pounds of clay material in 90 minutes.

The clean clay material is then placed into the second piece of equipment—the dryer system. This system can dry 150 pounds of clay material in approximately 90 minutes. Once the clay material is dried, it is ready to be used again.

3.0 TEST PLAN

The oil sorbent clay floor reclamation system will be tested in an operational environment. Data will be collected on the unit's effectiveness in reclaiming clay floor dry material, the reusability of the laundered clay material, and the cost savings and waste volume reductions gained.

3.1 Approach

Completion of Tables 1, 2, 3, and 4 during operation and maintenance of the system will acquire the necessary quantitative and qualitative data.

3.1.1 Daily Maintenance Tasks

To ensure proper operation of the equipment, the following maintenance tasks should be performed on a daily basis—regardless of whether the equipment is used.

- Check the laundering system to ensure that the solution temperature is between 95 °F and 105°F.
- Ensure that the laundering system's aerator is running.
- Skim floating oil from the top of the laundering solution as needed. The skimmed oil can be collected in a reservoir on the equipment. When the reservoir is full, it should be emptied. The reservoir may not need to be emptied every day.
- As needed, add small amounts of OCP-1103 odor control to the laundering solution to control odors.

3.1.2 Weekly Maintenance Tasks

To ensure proper operation of the equipment, the following maintenance tasks should be performed every week—regardless of whether the equipment is used.

- Check and adjust the pH of the laundering solution to maintain the pH level between 9 and 11. The best time to check the system's pH is one day after the system has been used to clean clay floor dry material.
- Maintain the water in the laundering system at the proper level. If the laundering basket is out of the tank, the water level should be maintained at about 2 to 3 inches below the skim slot in the tank. If needed, add water to the tank to maintain this level.

3.1.3 Instructions for Completing Table 1—Daily/Weekly Maintenance Checklist

The Daily/Weekly Maintenance Checklist ensures that proper maintenance is performed on the system. The only item requiring data on Table 1 is #1, "Volume of Oil Skimmed from Reservoir." The remaining items only need to be checked off.

- **Date:** In the appropriate box, record the date when the maintenance was performed.
- **Volume of Oil Skimmed from Reservoir:** The water solution in the laundering system should be skimmed every day to remove oil from the surface. The skimmed oil should be collected in a reservoir on the equipment. When the reservoir is full, it should be emptied. The reservoir may not need to be emptied daily. However, on days when the reservoir is emptied, record the volume of oil removed.
- **Add Odor Control As Needed:** Whenever needed, add Mi-Tech OCP-1103 to the water solution in the laundering system to control odors.
- **Solution Temperature Between 95°F and 105°F:** The solution temperature should be between 95°F and 105°F.
- **Aerator Running:** Check to ensure that the system's aerator is running.

The Weekly Maintenance Data items in Table 1 should be completed whenever weekly maintenance is performed.

- **Adjust Water Level:** When the laundering basket is out of the tank, the water level should be maintained at 2 to 3 inches below the skim slot in the tank. Add water to the tank to maintain this level.
- **pH of Water Between 9 and 11:** Once a week, the pH of the laundering solution must be adjusted so that the soap can clean the clay floor dry properly. Take a reading of the pH once a week—preferably one day after the system has been used to clean clay material.
 - If the initial pH of the laundering solution is below 9, add Mi-Tech pH-Adjust to raise the level.
 - If the initial pH of the laundering solution is above 11, add acetic acid (vinegar) to lower the level.

- If pH adjustments to the laundering solution are required, measure the final pH of the solution after adjustments are completed and verify that the pH is between 9 and 11.

3.1.4 Instructions for Completing Table 2—Operational Data

Operational data sheets should be filled out whenever the system is used to clean clay floor dry material.

- **Date:** Record the date when the system was operated.
- **Volume of Floor Dry To Be Laundered:** Record the gallons of clay floor dry material loaded into the laundering system.
- **Weight of Floor Dry To Be Laundered:** Record the pounds of clay floor dry material loaded into the laundering system.
- **Volume of Oil Removed from Skimmer After Laundering:** The skimmer reservoir should be emptied before and after the laundering system is used. Record the volume of the oil removed after the laundering system has been run to determine how much oil the skimmer removed from the clay material.
- **Volume of Material Removed from Filter Sock:** Record the amount of contaminants removed from the filter sock on the laundering system.
- **Results:** Record any comments on the performance of the laundering and drying systems in the spaces provided.

3.1.5 Instructions for Completing Table 3—Economic Cost Data

Economic cost data sheets should be filled out whenever a cost for waste disposal is incurred or consumables are purchased for the system.

Waste Disposal Data

- **Date:** Record the date when the waste was disposed of.
- **Description of Waste Material:** Provide a brief description of what material was disposed of. Check the appropriate column to indicate whether the waste was hazardous or non-hazardous.
- **Quantity:** Record the weight (pounds) and volume (gallons) of the waste disposed of.
- **Disposal Cost:** Record the cost of waste disposal, if known.
- **Contents of Waste:** If known, list the contents of the hazardous waste in the space provided.

Consumables Data

- **Date:** Record the date when any consumables (*e.g.*, extractants, pH-Adjust, filter socks) were purchased.
- **Description of Consumables Required:** Provide a brief description of the consumables purchased.
- **Quantity:** Record the quantity of the consumables purchased.
- **Total Cost:** Record the total cost of the consumables purchased.

- **Comments:** Provide any appropriate comments in the spaces provided.

3.1.6 Instructions for Completing Table 4—Service Failure Report

This report should be completed whenever the system is shut down due to a failure or repairs.

- **Date:** Record the date when the system first went down.
- **Operator:** Record the name of the operator who shut down the system or who is making repairs.
- **Description of What Happened:** Describe what is wrong with the system and why shut down was required. Also describe any causes or circumstances of the failure.
- **Corrective Actions Taken:** Describe any actions or repairs made to return the system to operation.
- **Repair Parts Required/Cost:** List any repair parts that must be ordered and their cost, if known. If known, include part numbers and quantity of parts.
- **Time Required for Repairs:** Record the man-hours required to make repairs.
- **Total Downtime Due to Failure:** Record the total amount of time that the system was inoperable because of the failure.
- **Comments:** Comment on whether the system downtime could have been avoided through better training in system operation or troubleshooting.

4.0 REPORTING

The data entry forms are a concise method of data collection. Forms should be completed as equipment is used. Data will be collected for 1 year. During this time, periodic status reports on the testing will be submitted to NAWCADLKE. The final report will include detailed results and observations, assess the efficiency and cost-effectiveness of the unit, and evaluate its ability to interface with site operations.

TABLE 1. DAILY/WEEKLY MAINTENANCE CHECKLIST

Bio-Cleaner 150 Clay Floor Dry Laundering System

Note: Only Item 1 requires data. The remaining boxes can be checked off when completed.

Week of _____		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date:	Date:	Date:	Date:	Date:	Date:	Date:
1	Volume of Oil Skimmed from Reservoir (In Gallons)							
2	Add Odor Control As Needed							
3	Solution Temperature between 95 and 105 Degrees F							
4	Aerator Running							
5	Adjust Water Level							
6	pH of Water between 9 and 11							

Week of _____		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date:	Date:	Date:	Date:	Date:	Date:	Date:
1	Volume of Oil Skimmed from Reservoir (In Gallons)							
2	Add Odor Control As Needed							
3	Solution Temperature between 95 and 105 Degrees F							
4	Aerator Running							
5	Adjust Water Level							
6	pH of Water between 9 and 11							

Week of _____		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date:	Date:	Date:	Date:	Date:	Date:	Date:
1	Volume of Oil Skimmed from Reservoir (In Gallons)							
2	Add Odor Control As Needed							
3	Solution Temperature between 95 and 105 Degrees F							
4	Aerator Running							
5	Adjust Water Level							
6	pH of Water between 9 and 11							

Week of _____		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date:	Date:	Date:	Date:	Date:	Date:	Date:
1	Volume of Oil Skimmed from Reservoir (In Gallons)							
2	Add Odor Control As Needed							
3	Solution Temperature between 95 and 105 Degrees F							
4	Aerator Running							
5	Adjust Water Level							
6	pH of Water between 9 and 11							

Table 2. Operational Data
 Bio-Cleaner 150 Clay Floor Dry Laundering System

MONTH _____

LAUNDERING SYSTEM OPERATIONAL DATA				
Date	Volume Of Floor Dry To Be Laundered (Gallons)	Weight Of Floor Dry To Be Laundered (Gallons)	Volume Of Oil Removed From Skimmer After Laundering	Volume Of Material Removed From Filter Sock

RESULTS

Please comment on how well the system removed contaminants from the clay floor dry:
Please comment on how reusable and absorbent the clay floor dry is after laundering:
Additional comments:

Table 3. Economic Cost Data
Bio-Cleaner 150 Clay Floor Dry Laundering System

MONTH _____

WASTE DISPOSAL DATA						
Date	Description of Waste Material	Check One		Quantity		Disposal Cost
		Hazardous	Non-Hazardous	(Pounds)	(Gallons)	

List contents of hazardous waste if known:

CONSUMABLES DATA*			
Date	Description of Consumables Required	Quantity	Total Cost

*Note: Consumables include extractants, pH-Adjust, filter socks, etc.

Comments:

Table 4. Service Failure Report
Bio-Cleaner 150 Clay Floor Dry Laundering System

Date:

Operator:

Description of What Happened:

Corrective Actions Taken:

Repair Parts Required/Cost (If Known):

Time Required for Repairs:

Total Downtime Due to Failure:

Could This Problem Have Been Avoided Through Better Training?

Additional Comments: